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(54) DIVIDING AND ARRANGING METHOD FOR RECORDING REGION ON RECORDING MEDIUM IN BROADCAST RECEIVING SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To perform a time-delay viewing operation easily by a

method wherein a circular buffer region in which a first video-taped broadcasting signal is reproduced in real time is arranged in the prescribed position of a recording medium, a video file region in which a second video-taped broadcasting signal is controlled is arranged in the other prescribed position of the recording medium, and a control information region is arranged in the other prescribed position of the recording medium.

SOLUTION: A circular buffer region 130 for a time-delay viewing operation is set in a hard-disk recording region, preferably in right and left adjacent tracks which use a center track #n/2 as a moundary. On the other hand, video file regions #1 110A, #2 110B which are situated respectively in the outer circumferential side and the inner circumferential side of a hard dick are used as regions in which a broadcasting signal is video-taped in a reserved time, and a video stream which is video-taped according to a recording time is controlled in units of a logic file. When the circular buffer region 130 is arranged in the central part of the hard-disk recording region, an average search time can be minimized.

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CLAIMS

[Claim(s)]

[Claim 1] It is the record section division configuration method of the record medium in the broadcast receiving system equipped with random access storage equipment. The 1st process which arranges a circular buffer area to perform playback of the 1st broadcast signal recorded on videotape at the past time in the real time in the predetermined location of said record medium, recording the 1st broadcast signal on videotape, The 2nd process which arranges the video-file field for managing the 2nd broadcast signal recorded on videotape according to time amount in a logical file unit in other predetermined locations of said record medium, The record section division configuration method of the record medium characterized by the information on the file recorded consisting of the 3rd process which arranges the control information field by which record storage is carried out in other predetermined locations of said record medium again.

[Claim 2] Said video-file field is the record section division configuration method of the record medium according to claim 1 by which is divided into many small fields and individual management is carried out.

[Claim 3] Said circular buffer area and video-file field are the record section division configuration method of the record medium according to claim 1 which consists of a block of the fixed magnitude.

[Claim 4] The record section division configuration method of the record medium according to claim 1 or 2 which carries out discontinuous arrangement of the video-file block, and manages it in said video-file field.

[Claim 5] The record section division configuration method of a record medium given in claim 1 characterized by including further the 4th process which arranges the general file space for managing the file which stores other information other than a continuation medium like video information in other predetermined locations of said record medium again thru/or any 1 term of 3.

[Claim 6] In the record section division configuration method of the record medium in the broadcast receiving system equipped with the hard disk drive The 1st process which assigns a circular buffer area to perform playback of the 1st broadcast signal recorded on videotape at the past time in the real time to the core of said hard disk recording surface, recording the 1st broadcast signal on videotape, The 2nd process which assigns the video-file field for managing the 2nd broadcast signal recorded on videotape according to time amount in a logical file unit to the inner circumference section and the periphery section of said hard disk recording surface, respectively, The 3rd process which assigns the general file space for managing the file which stores other information other than a continuation medium like video information to

the boundary part of said circular buffer area, The record section division configuration method of the record medium characterized by the information on the file recorded consisting of the 4th process which assigns the control information field by which record storage is carried out to the boundary part of said circular buffer area and video-file field.

[Claim 7] Said circular buffer area is the record section division configuration method of the record medium according to claim 6 assigned so that the symmetry may be made on the basis of the main truck of said hard disk recording surface.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the approach of carrying out division arrangement of the record section of a record medium so that a broadcast program may be recorded on videotape to coincidence and it may reproduce to it, permitting time delay viewing and listening of especially as opposed to a broadcast signal for time delay viewing and listening to a broadcast signal, an image transcription, and playback about a broadcast receiving system supportable to coincidence.

[0002]

[Description of the Prior Art] I hear that random access is possible for the hard disk drive which is the auxiliary storage unit of a computer system, a data transmission rate is a high speed, and large-capacity-izing is more possible for it than other auxiliary storage units at a low price, and it is used as random access storage equipment of a broadcast receiving system.

[0003] A broadcast receiving system equipped with random access storage equipment is a system in which the coincidence image transcription of the video stream broadcast and playback, and time delay viewing and listening are possible. Time delay viewing and listening of such a broadcast signal, the coincidence image transcription of a video stream, and playback may be embodied by carrying out buffering control of the video stream outputted and inputted by the hard disk drive.

[0004] Hereafter, how to arrange a video stream to the hard disk side of a record medium by the broadcast receiving system in which an image transcription and playback are possible is explained to time delay viewing and listening and coincidence.

[0005] Drawing 1 is drawing for explaining how to manage a hard disk with a circular buffer gestalt by the broadcast receiving system for time delay viewing and listening, and drawing 2 is drawing for explaining other approaches of managing so that many video streams may be arranged in discontinuous in respect of a hard disk again.

[0006] As shown in drawing 1 , when managing a hard disk in one circular buffer gestalt, record storage of the video stream is carried out at the block of the fixed magnitude. And in managing a hard disk with a circular buffer, after writing in, reading with Point W and setting up Point R, record storage of the new video stream is carried out, moving clockwise on the basis of the write-in point W. On the contrary, at the time of read-out actuation, random access is possible, the circular buffer is made at it at the time of arbitration, and a predetermined video stream is reproduced.

[0007] The hard disk field in the approach of arranging a video stream in discontinuous and on the other hand managing it as shown in drawing 2 consists of a block of fixed magnitude, and the video stream recorded on videotape is stored in the logical video-file unit which consists of much blocks. In such a case, the block which constitutes each video file is not necessarily continuation physically. The reason is that a discontinuous free block occurs the video file from which magnitude differs mutually being deleted. On the other hand, record storage of the various information (a title, hour entry, etc.) relevant to each video file and the positional information of the block belonging to each file is carried out to a special control information field.

[0008] Drawing 3 illustrates the I/O transaction scheduling of the hard disk drive for recording on videotape and reproducing many video streams in the real time. This drawing shows the example which processes three video streams using a C-LOOK algorithm in the I/O transaction scheduling approach of the hard disk drive for recording on videotape and reproducing many video streams to coincidence. Fundamentally this C-LOOK algorithm Reference "IEEE Computer.Vol.27 and No.3 and "I/OISSUES in a Multimedia System" pp 67-74, March 1994.Reddy A.L.N., andWyllie J.C.", " reference Computer Communications, Vol 18, No.3, and "Multimedia File Systems Survey: Approaches for Continuous Media Disk Scheduling" pp 133-144, March 1995, the SCAN-Earliest-Deadline-First (SCAN-EDF) method of Ralf Steinmetz", Since it is similar to the gated image operation (Gated Operation) method indicated by United States patent (U. S.P.) 5,754,882, it omits in the following explanation.

[0009] With reference to drawing 3 , video stream #1 and #2 are the video streams under playback, and video stream #3 are a video stream under image transcription. In most methods of processing a video stream, I/O (I/O) control of a hard disk drive is carried out by every fixed period T, and processes each video stream within each period. For example, if the block stored in the hard disk side is read so that video stream #1 and #2 may be outputted by periodic Ti-1 position, it will be reproduced among these periods Ti (in a video treater, it corresponds to consumption (KONSAMPUSHON)). In order to perform continuous playback without delay, the block reproduced by the following period for every period must be read by the hard disk drive. On the other hand, the case of an image transcription should make a block generate beforehand before the period in which a block is written, and should be

transmitted to the hard disk drive. Although the sequence of processing each video stream within one period changes according to the specific I/O (I/O) transaction scheduling approach, it is made in agreement [the sequence of processing each video stream] with the head migration direction with a C-LOOK algorithm. For example, if the head of HDD moves to the most inner track from an outermost periphery truck and video stream block #1, #2, and #3 are located in truck #10, #100, and #60, respectively, as shown in drawing 3 , it will be read in video stream #1, #3, and #2 order a period Ti.

[0010] However, although the part which put time difference on coincidence and was already recorded on videotape is reproducible in the broadcast receiving system which manages a hard disk field with a circular buffer gestalt as shown in drawing 1 , recording one video stream on videotape, many video streams cannot be recorded on videotape to coincidence, and it cannot reproduce. Moreover, it is impossible to constitute a video stream from a logical video-file unit, and it has the demerit in which deletion of the video file of arbitration is impossible.

[0011] since it be the structure where of a re-activity of a block be automatically perform on the other hand in the space restricted like a circular buffer although there be the advantage in_which of the video stream recorded on videotape can be constitute from a logical file unit , in the broadcast receiving system which arrange a video stream in discontinuous and manage it as showed in drawing 2 since hard disk space be freely utilizable , the buffer control for time delay viewing and listening be easy . The reason is that free blocks are scattered.

[0012]

[Problem(s) to be Solved by the Invention] Therefore, the purpose of this invention is to provide the conventional time delay viewing and listening and coincidence which were mentioned above with the approach for solving the trouble on the activity of the record section of a record medium by the broadcast signal image transcription and the refreshable broadcast receiving system.

[0013] Other purposes of this invention are to offer the approach that the record section of a record medium is divided efficiently and can be managed so that a time delay viewing-and-listening function may be offered by the broadcast receiving system and much video stream image transcriptions and playbacks may be performed.

[0014] Moreover, the purpose of this invention is to offer a time delay viewing-and-listening function, and offer the record section division configuration method of the record medium with which much video stream image transcriptions and playbacks are made to be performed at a high speed.

[0015]

[Means for Solving the Problem] In order to attain such a purpose, this invention is the record section division configuration method of the record medium in a broadcast receiving system equipped with random access storage equipment. The 1st process

which arranges a circular buffer area to perform playback of the 1st broadcast signal recorded on videotape at the past time in the real time in the predetermined location of said record medium, recording the 1st broadcast signal on videotape, The 2nd process which arranges the video-file field for managing the 2nd broadcast signal recorded on videotape according to time amount in a logical file unit in other predetermined locations of said record medium, It is characterized by the information on the file recorded consisting of the 3rd process which arranges the control information field by which record storage is carried out in other predetermined locations of said record medium again.

[0016]

[Embodiment of the Invention] Hereafter, actuation by the example of this invention is explained to a detail with reference to an attached drawing.

[0017] Drawing 4 shows the block block diagram of the broadcast receiving system in which a broadcast signal image transcription and playback are possible to time delay viewing and listening and coincidence by one example of this invention.

[0018] With reference to this drawing, the broadcast signal receive section 10 consists of two or more video compressors 18, 20, and 22 which change and compress into a digital signal the analog signal inputted through the RF tuner 12 for receiving reception of the digital broadcast signal inputted from the outside, many RF tuners 14 and 16 for receiving the input of the analog broadcasting signal inputted from the outside, and the RF tuners 14 and 16 of said large number.

[0019] Random access storage equipment 30 carries out record storage of the digital video stream inputted from the broadcast signal receive section 10 by control of a control section 40 in the hard disk side of a record medium, reads the stored video stream, and outputs it to the video restoration section 50. Random access storage equipment 30 consists of extensions for making the hard disk for storing eternally the dual port RAM 32 for storing said digital video stream temporarily, and a digital video stream as everyone knows, the HDD control section which controls the drive of a drive, and a hard disk drive extend. Said extension is an IEEE1394 interface.

[0020] The video restoration section 50 restores the video stream outputted from random access storage equipment 30 through a system bus to the original signal, and outputs it to a television receiver 90.

[0021] A control section 40 is equipped with the memory which consists of RAM for carrying out temporary storage of ROM in which the control program data for controlling random access storage equipment 30 and the broadcast signal receive section 10 are stored, and the data generated at the time of control action.

[0022] The remote controller 60 is equipped with many adjustment keys for system control, generates the data based on actuation of this adjustment key, and outputs them to a control section 40. The adjustment key of these large number consists of an adjustment key for making an instruction of a halt, rewinding, and a high-speed search

etc. input.

[0023] The computer connection 70 carries out the interface of the signal transmitted and received between the broadcast receiving systems and computers by the example of this invention, the time amount check section 80 tells a hour entry, and a broadcast receiving system enables it to carry out an automatic image transcription.

[0024] Drawing 5 shows the hard disk record section division instantiation Fig. by one example of this invention. A hard disk record section is divided into four fields in the example of this invention. At this time, it is assumed that it is what instructs the field from an outermost periphery truck (truck #0) to the most inner track (truck #n) to be a hard disk record section. The hard disk record section by the example of this invention is divided into video-file field #1, #2 (110A, 110B), the control information field 120, the circular buffer area 130 for time delay viewing and listening, and the general file space 140. Thus, the reason for dividing a hard disk record section into four fields is for recording on videotape and reproducing a broadcast signal efficiently with time delay viewing and listening of the signal broadcast.

[0025] The application of each field mentioned above below is explained. First, the circular buffer area 130 for time delay viewing and listening is a field to perform playback of the broadcast signal recorded on videotape at the past time in the real time, recording the signal under broadcast on videotape. Although such a circular buffer area 130 can be located anywhere in a hard disk record section, it is desirable to set center truck n / 2 as the truck which adjoins the right and left on a boundary, as shown in drawing 5 . The reason is for making time delay viewing and listening and coincidence minimize the retrieval transit time of a head at the time of the image transcription of a specific channel broadcast signal, or playback.

[0026] On the other hand, the video stream which video-file field #1 located in a hard disk periphery and inner circumference side, respectively and #2 (110A, 110B) are the fields for recording on videotape to the time amount which had the broadcast signal reserved, and was recorded on videotape according to image transcription time amount is managed in a logical file unit. A discontinuous configuration method is used like drawing 2 as a video-file configuration method in such video-file fields 110A and 110B.

[0027] The general file space 140 is a field for managing the file which stores other information other than a continuation medium like video, and this also manages it using a discontinuous configuration method.

[0028] The control information field 120 is a field where record storage of the various information (a title, hour entry, etc.) relevant to each video file and the positional information of the block belonging to each file is carried out.

[0029] On the other hand, drawing 6 is what illustrated the video stream by which record storage is carried out to the hard disk record section divided according to one example of this invention, and it illustrates that four video stream blocks are arranged

to each field. And drawing 7 is drawing for explaining the process in which each stream assigned like drawing 6 using the C-LOOK algorithm is processed.

[0030] In drawing 6 , video stream #1 (220) shows the video stream currently recorded on videotape for time delay viewing and listening, record storage is carried out in the circular buffer area 130, and video stream #2 (210) shows the video stream already recorded on videotape for time delay viewing and listening. Video stream #3 (230) is the video stream currently separately recorded on videotape not related to the broadcast under current viewing and listening, and record storage is carried out video-file field #2 (110B), video stream #4 (200) is a video stream belonging to the video file already recorded on videotape, and it illustrates the condition of being stored in video-file field #1 (110A).

[0031] If it is chosen so that such instantiation may be assumed and time delay viewing and listening and playback actuation may be performed to coincidence, a video stream will be read or recorded in the sequence which a track number increases with a C-LOOK algorithm. In such a case, as shown in drawing 7 , the video stream-I/O (I/O) processing sequence of a hard disk drive (HDD) is made by the order of video stream #4, #2, #1, and #3. Thereby, video stream #1 (220) and #3 (230) are inputted into a dual port RAM 32 by periodic Ti-1, and they are recorded on the record section where the hard disk drive 34 was assigned the period Ti. On the other hand, video stream #2 (210) and #4 (200) are read from a hard disk record section a period Ti, and they are outputted to the video restoration section 50 from a dual port RAM 32 by periodic Ti+1 (playback). If it assumes that playback is continuously performed without delay, the video stream reproduced by the following period for every period must be read from a record section, and the case of an image transcription should make the video stream generate beforehand on the contrary before the period on which a video stream is recorded.

[0032] If the circular buffer area 130 is arranged into the center part of a hard disk record section as mentioned above, it can minimize, the transit time, i.e., the average search time, of the head generated on the average compared with the case where that is not right.

[0033] Drawing 8 is what simplified the hard disk record section by the example of this invention, and the truck with which record storage of two video stream blocks is carried out shows the condition that only i and j were isolated from n (the truck or field in which a circular buffer area is located), respectively. If the block of the video stream processed in a circular buffer area and two video streams of arbitration is processed using a C-LOOK algorithm when the circular buffer area is located in n as illustrated, only i must carry out retrieval. However, if the circular buffer area is located in a truck 0, since retrieval of only i+n should be carried out, it must search for the distance of only n further. That is, in this invention carrying out image transcription and playback to time delay viewing and listening and coincidence, it

becomes possible to decrease the transit time of a head.

[0034]

[Effect of the Invention] This invention has the effectiveness which can constitute a video stream from a logical video-file unit as well as the re-activity of a record section being automatically performed in the restricted space by using it to a circular buffer area and a discontinuous file arrangement field by the broadcast receiving system in which a broadcast signal image transcription and playback are possible , dividing the record section of a record medium into time delay viewing and listening and coincidence . Moreover, deletion of the video file of the arbitration recorded alternatively is possible, and there is effectiveness which can be made to be able to shorten the search time of a head and can accelerate a data-access rate rather than anything.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing for explaining how to manage a hard disk with a circular buffer gestalt by the broadcast receiving system for time delay viewing and listening.

[Drawing 2] It is drawing for explaining other approaches of managing so that many video streams may be arranged in discontinuous in respect of a hard disk.

[Drawing 3] It is the I/O transaction scheduling instantiation Fig. of the hard disk drive for recording on videotape and reproducing many video streams in the real time.

[Drawing 4] It is the block block diagram of the broadcast receiving system in which a broadcast signal image transcription and playback are possible at time delay viewing and listening and coincidence by one example of this invention.

[Drawing 5] It is the division arrangement instantiation Fig. of the hard disk record section by one example of this invention.

[Drawing 6] It is the instantiation Fig. of the video stream by which record storage is carried out in the hard disk record section divided according to one example of this invention.

[Drawing 7] It is drawing for explaining the process in which each stream assigned like drawing 6 using the C-LOOK algorithm is processed.

[Drawing 8] It is drawing which simplified the hard disk record section by the example of this invention.

[Description of Notations]

10 Broadcast Signal Receive Section

12, 14, 16 RF tuner

18, 20, 22 Compressor

30 Random Access Storage Equipment
32 Dual Port RAM
34 HDD (Hard Disk Drive)
40 Control Section
50 Video Restoration Section
60 Remote-Control Section
70 Computer Connection
80 Time Amount Check Section
90 Television Television Section
110A, 110B Video-file field
120 Control Information Field
130 Circular Buffer Area
140 General File Space
200, 210, 220, 230 Video stream

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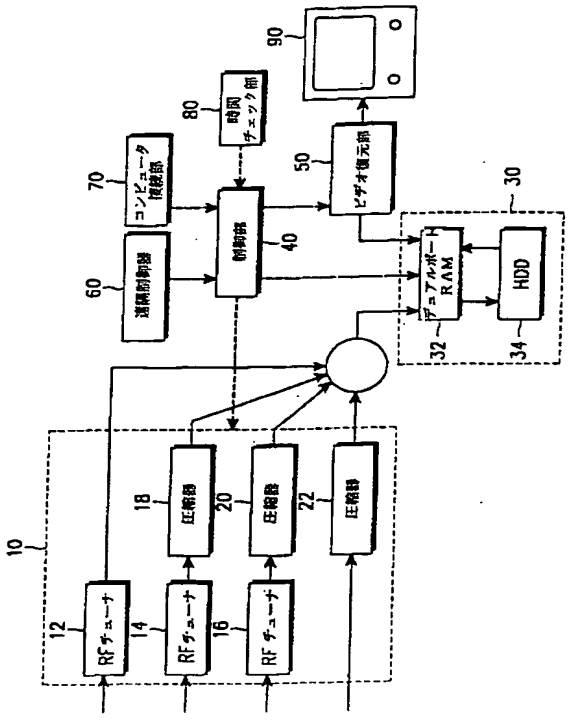
(54)【発明の名称】　放送受信システムにおける記録媒体の記録領域分割配置方法

(57)【要約】
【課題】　放送受信システムで時間遅延視聴機能を提供し、且つ多数のビデオストリーム録画及び再生が行われるように記録媒体の記録領域を効率的に分割して管理できる方法を提供する。
【解決手段】　本発明は、ランダムアクセス貯蔵装置を備えた放送受信システムにおける記録媒体の記録領域分割配置方法であって、第１放送信号を録画しつつ過去時点で録画された第１放送信号の再生が実時間で行われるようにするための円形バッファ領域を前記記録媒体の所定位置に配置する第１過程と、時間にしたがって録画される第２放送信号を論理的ファイル単位で管理するためのビデオファイル領域を前記記録媒体の他の所定位置に配置する第２過程と、記録されるファイルの情報が記録貯蔵される制御情報領域を前記記録媒体のまた他の所定位置に配置する第３過程とからなる。



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【特許請求の範囲】

【請求項１】　ランダムアクセス貯蔵装置を備えた放送受信システムにおける記録媒体の記録領域分割配置方法であって、

第１放送信号を録画しつつ過去時点で録画された第１放送信号の再生が実時間で行われるようにするための円形バッファ領域を前記記録媒体の所定位置に配置する第１過程と、

時間にしたがって録画される第２放送信号を論理的ファイル単位で管理するためのビデオファイル領域を前記記録媒体の他の所定位置に配置する第２過程と、

記録されるファイルの情報が記録貯蔵される制御情報領域を前記記録媒体のまた他の所定位置に配置する第３過程とからなることを特徴とする記録媒体の記録領域分割配置方法。

【請求項２】　前記ビデオファイル領域は多数の小領域に分割されて個別管理される請求項１記載の記録媒体の記録領域分割配置方法。

【請求項３】　前記円形バッファ領域とビデオファイル領域は固定した大きさのブロックからなる請求項１記載の記録媒体の記録領域分割配置方法。

【請求項４】　前記ビデオファイル領域にはビデオファイルブロックを非連続配置して管理する請求項１または２記載の記録媒体の記録領域分割配置方法。

【請求項５】　ビデオ情報のような連続媒体以外の他の情報を貯蔵するファイルを管理するための一般ファイル領域を前記記録媒体のまた他の所定位置に配置する第４過程をさらに含むことを特徴とする請求項１乃至３のいずれか１項に記載の記録媒体の記録領域分割配置方法。

【請求項６】　ハードディスクドライブを備えた放送受信システムにおける記録媒体の記録領域分割配置方法において、

第１放送信号を録画しつつ過去時点で録画された第１放送信号の再生が実時間で行われるようにするための円形バッファ領域を前記ハードディスク記録面の中心部に割り当てる第１過程と、

時間にしたがって録画される第２放送信号を論理的ファイル単位で管理するためのビデオファイル領域を前記ハードディスク記録面の内周部と外周部にそれぞれ割り当てる第２過程と、

ビデオ情報のような連続媒体以外の他の情報を貯蔵するファイルを管理するための一般ファイル領域を前記円形バッファ領域の境界部分に割り当てる第３過程と、

記録されるファイルの情報が記録貯蔵される制御情報領域を前記円形バッファ領域とビデオファイル領域の境界部分に割り当てる第４過程とからなることを特徴とする記録媒体の記録領域分割配置方法。

【請求項７】　前記円形バッファ領域は前記ハードディスク記録面の中心トラックを基準として対称をなすように割り当てられる請求項６記載の記録媒体の記録領域分割配置方法。

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【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は放送信号に対する時間遅延視聴と録画及び再生を同時に支援可能な放送受信システムに関して、特に放送信号に対する時間遅延視聴を許容しながら、同時に放送プログラムを録画し再生するように記録媒体の記録領域を分割配置する方法に関するものである。

【０００２】

【従来の技術】コンピュータシステムの補助記憶装置であるハードディスクドライブはランダムアクセスが可能であり、データ伝送速度が高速で且つ他の補助記憶装置より低価格で大容量化が可能であるということで、放送受信システムのランダムアクセス貯蔵装置として使用されている。

【０００３】ランダムアクセス貯蔵装置を備える放送受信システムは放送されるビデオストリームの同時録画及び再生、時間遅延視聴が可能なシステムである。このような放送信号の時間遅延視聴及びビデオストリームの同時録画及び再生はハードディスクドライブに入出力されるビデオストリームをバッファリング制御することにより具現され得る。

【０００４】以下、時間遅延視聴と同時に録画及び再生が可能な放送受信システムで記録媒体のハードディスク面にビデオストリームを配置する方法について説明する。

【０００５】図１は時間遅延視聴のための放送受信システムでハードディスクを円形バッファ形態で管理する方法を説明するための図で、図２は多数のビデオストリームがハードディスク面で非連続的に配置されるように管理するまた他の方法を説明するための図である。

【０００６】図１に示すように、ハードディスクを一つの円形バッファ形態に管理する場合にビデオストリームは固定した大きさのブロックに記録貯蔵される。そして、ハードディスクを円形バッファで管理する場合には書き込み地点Ｗと読み出し地点Ｒを設定した後、書き込み地点Ｗを基準として時計方向に移動しつつ新たなビデオストリームを記録貯蔵する。反対に、読み出し動作時には円形バッファを任意の時点でランダムアクセス可能なようにして所定のビデオストリームが再生される。

【０００７】一方、図２に示すようにビデオストリームを非連続的に配置して管理する方法においてのハードディスク領域は、一定の大きさのブロックからなり、録画されたビデオストリームは多数のブロックからなる論理的ビデオファイル単位で貯蔵される。このような場合、各ビデオファイルを構成するブロックは物理的に必ずしも連続ではない。その理由は、相互に大きさの異なるビデオファイルが削除されつつ非連続的自由ブロックが発生するからである。一方、各ビデオファイルに関連した

各種情報（タイトル、時間情報など）と各ファイルに属するブロックの位置情報は別途の制御情報領域に記録貯蔵される。

【０００８】図３は多数のビデオストリームを実時間で録画及び再生するためのハードディスクドライブのＩ／Ｏトランザクションスケジューリングを例示する。同図は多数のビデオストリームを同時に録画及び再生するためのハードディスクドライブのＩ／Ｏトランザクションスケジューリング方法の中でＣ－ＬＯＯＫアルゴリズムを使用して３つのビデオストリームを処理する例を示すものである。このＣ－ＬＯＯＫアルゴリズムは基本的に文献「IEEE Computer. Vol. 27, No. 3, "I/OISSUES in a Multimedia System" pp 67-74, March 1994. Reddy A.L.N., andWyllie J.C.」、文献「Computer Communications, Vol 18, No. 3, "Multimedia File Systems Survey: Approaches for Continuous Media Disk Scheduling" pp 133-144, March 1995, Ralf Steinmetz」のSCAN-Earliest-Deadline-First（ＳＣＡＮ－ＥＤＦ）方式、米国特許（Ｕ．Ｓ．Ｐ．）５，７５４，８８２に開示されたゲーテッドオペレーション（Gated Operation）方式に類似するため、下記の説明では省略する。

【０００９】図３を参照するに、ビデオストリーム＃１及び＃２は再生中のビデオストリームで、ビデオストリーム＃３は録画中のビデオストリームである。ビデオストリームを処理する大部分の方法において、ハードディスクドライブの入出力（Ｉ／Ｏ）制御は一定の周期Ｔ毎に遂行され、各周期内でそれぞれのビデオストリームを処理する。例えば、周期Ｔｉ－１番目でビデオストリーム＃１及び＃２が出力されるようにハードディスク面に貯蔵されたブロックを読み出すと、これら周期Ｔｉの間に再生（ビデオ処理器においては消費（コンサンプション）に該当）される。遅延なく連続的再生が行われるようにするためには、各周期毎に次の周期に再生されるブロックをハードディスクドライブで読み出さなければならない。その反面、録画の場合はブロックが書き込まれる周期以前に予めブロックを生成させてハードディスクドライブに伝送すべきである。一つの周期内でそれぞれのビデオストリームを処理する順序は特定の入出力（Ｉ／Ｏ）トランザクションスケジューリング方法に従って変わるが、Ｃ－ＬＯＯＫアルゴリズムでは各ビデオストリームを処理する順序がヘッド移動方向と一致するようにする。例えば、ＨＤＤのヘッドが最外周トラックから最内周トラックに移動し、ビデオストリームブロック＃１、＃２、＃３がそれぞれトラック＃１０、＃１００、＃６０に位置していると、図３に示したように周期Ｔｉでビデオストリーム＃１、＃３、＃２順に読み出される。

【００１０】しかし、ハードディスク領域を図１に示したように円形バッファ形態で管理する放送受信システムでは一つのビデオストリームを録画しながら、同時に時間差を置いて既に録画された部分を再生できるが、多数のビデオストリームを同時に録画し再生することはできない。また、ビデオストリームを論理的のビデオファイル単位で構成することが不可能であり、任意のビデオファイルの削除が不可能であるという短所を有する。

【００１１】一方、図２に示したようにビデオストリームを非連続的に配置して管理する放送受信システムにおいては、ハードディスク空間を自由に活用可能なので、録画されたビデオストリームを論理的なファイル単位で構成できるという長所があるが、円形バッファのように制限された空間内でブロックの再活用が自動的に行われる構造でないので、時間遅延視聴のためのバッファ管理が容易でない。その理由は、自由ブロックが散在しているからである。

【００１２】

【発明が解決しようとする課題】したがって本発明の目的は、上述した従来の時間遅延視聴と同時に放送信号録画及び再生可能な放送受信システムで記録媒体の記録領域の活用上の問題点を解決するための方法を提供することにある。

【００１３】本発明の他の目的は、放送受信システムで時間遅延視聴機能を提供し、且つ多数のビデオストリーム録画及び再生が行われるように記録媒体の記録領域を効率的に分割して管理できる方法を提供することにある。

【００１４】また本発明の目的は、時間遅延視聴機能を提供し、且つ多数のビデオストリーム録画及び再生が高速に行われるようにする記録媒体の記録領域分割配置方法を提供することにある。

【００１５】

【課題を解決するための手段】このような目的を達成するために本発明は、ランダムアクセス貯蔵装置を備える放送受信システムにおける記録媒体の記録領域分割配置方法であって、第１放送信号を録画しつつ過去時点で録画された第１放送信号の再生が実時間で行われるようにするための円形バッファ領域を前記記録媒体の所定位置に配置する第１過程と、時間にしたがって録画される第２放送信号を論理的ファイル単位で管理するためのビデオファイル領域を前記記録媒体の他の所定位置に配置する第２過程と、記録されるファイルの情報が記録貯蔵される制御情報領域を前記記録媒体のまた他の所定位置に配置する第３過程とからなることを特徴とする。

【００１６】

【発明の実施の形態】以下、添付の図面を参照して本発明の実施例による動作を詳細に説明する。

【００１７】図４は、本発明の一実施例による時間遅延視聴と同時に放送信号録画及び再生が可能な放送受信システムのブロック構成図を示すものである。

【００１８】同図を参照するに、放送信号受信部１０は外部から入力されるディジタル放送信号の受信を受ける

ためのＲＦチューナ１２と、外部から入力されるアナログ放送信号の入力を受けるための多数のＲＦチューナ１４、１６と、前記多数のＲＦチューナ１４、１６を通じて入力されるアナログ信号をディジタル信号に変換して圧縮する複数のビデオ圧縮器１８、２０、２２とから構成される。

【００１９】ランダムアクセス貯蔵装置３０は制御部４０の制御により放送信号受信部１０から入力されるディジタルビデオストリームを記録媒体のハードディスク面に記録貯蔵し、貯蔵されたビデオストリームを読み出してビデオ復元部５０に出力する。ランダムアクセス貯蔵装置３０は周知のように、前記ディジタルビデオストリームを臨時に貯蔵するためのデュアルポートＲＡＭ３２、ディジタルビデオストリームを永久的に貯蔵するためのハードディスク、ドライブの駆動を制御するＨＤＤ制御部、及びハードディスクドライブを拡張させるための拡張部で構成される。前記拡張部はＩＥＥＥ１３９４インタフェースである。

【００２０】ビデオ復元部５０は、システムバスを通じてランダムアクセス貯蔵装置３０から出力されるビデオストリームを元の信号に復元してテレビジョン受像機９０に出力する。

【００２１】制御部４０は、ランダムアクセス貯蔵装置３０及び放送信号受信部１０を制御するための制御プログラムデータが貯蔵されるＲＯＭと、制御動作時に発生するデータを一時貯蔵するためのＲＡＭで構成されるメモリを備える。

【００２２】遠隔制御器６０はシステム制御のための多数の調整キーを備えており、この調整キーの操作によるデータを発生して制御部４０に出力する。この多数の調整キーは一時停止、巻き戻し、高速サーチの命令などを入力させるための調整キーからなる。

【００２３】コンピュータ接続部７０は本発明の実施例による放送受信システムとコンピュータとの間に送受信される信号をインタフェースし、時間チェック部８０は時間情報を知らせて放送受信システムが自動録画を遂行できるようにする。

【００２４】図５は、本発明の一実施例によるハードディスク記録領域分割例示図を示す。本発明の実施例ではハードディスク記録領域を４つの領域に分割する。このとき、ハードディスク記録領域とは、最外周トラック（トラック＃０）から最内周トラック（トラック＃ｎ）までの領域を指示するものと仮定する。本発明の実施例によるハードディスク記録領域はビデオファイル領域＃１、＃２（１１０Ａ、１１０Ｂ）、制御情報領域１２０、時間遅延視聴用の円形バッファ領域１３０、及び一般ファイル領域１４０に分割される。このように、ハードディスク記録領域を４つの領域に分割する理由は、放送される信号の時間遅延視聴とともに効率的に放送信号を録画及び再生するためである。

【００２５】以下上述した各領域の用途を説明する。まず、時間遅延視聴のための円形バッファ領域１３０は放送中の信号を録画しつつ過去時点で録画された放送信号の再生が実時間で行われるようにするための領域である。このような円形バッファ領域１３０はハードディスク記録領域のどこでも位置できるが、図５に示すようにセンタトラックｎ／２を境界でその左右に隣接するトラックに設定するのが望ましい。その理由は、時間遅延視聴と同時に特定チャンネル放送信号の録画あるいは再生時にヘッドの探索移動時間を最小化させるためである。

【００２６】一方、ハードディスク外周側と内周側にそれぞれ位置するビデオファイル領域＃１、＃２（１１０Ａ、１１０Ｂ）は放送信号を予約された時間に録画するための領域であって、録画時間にしたがって録画されたビデオストリームは論理的ファイル単位で管理される。このようなビデオファイル領域１１０Ａ、１１０Ｂでのビデオファイル配置方法としては図２のように非連続配置方法を使用する。

【００２７】一般ファイル領域１４０はビデオのような連続媒体以外の他の情報を貯蔵するファイルを管理するための領域であって、これも非連続配置方法を使用して管理する。

【００２８】制御情報領域１２０は各ビデオファイルに関連した各種情報（タイトル、時間情報など）と各ファイルに属するブロックの位置情報が記録貯蔵される領域である。

【００２９】一方、図６は本発明の一実施例により分割されるハードディスク記録領域に記録貯蔵されるビデオストリームを例示したもので、４つのビデオストリームブロックがそれぞれの領域に配置されるのを例示する。そして、図７はＣ－ＬＯＯＫアルゴリズムを使用して図６のように割り当てられた各ストリームを処理する過程を説明するための図である。

【００３０】図６において、ビデオストリーム＃１（２２０）は時間遅延視聴のために録画しているビデオストリームを示すもので、円形バッファ領域１３０に記録貯蔵され、ビデオストリーム＃２（２１０）は時間遅延視聴のために既に録画されたビデオストリームを示す。ビデオストリーム＃３（２３０）は現在視聴中の放送に関係なく別途に録画しているビデオストリームで、ビデオファイル領域＃２（１１０Ｂ）に記録貯蔵され、ビデオストリーム＃４（２００）は既に録画されたビデオファイルに属するビデオストリームで、ビデオファイル領域＃１（１１０Ａ）に貯蔵されている状態を例示するものである。

【００３１】このような例示を仮定して時間遅延視聴と再生動作が同時に行われるように選択されたら、Ｃ－ＬＯＯＫアルゴリズムによりトラック番号が増加する順序でビデオストリームを読み出したり記録したりする。このような場合、図７に示すようにハードディスクドライ

ブ（ＨＤＤ）のビデオストリーム入出力（Ｉ／Ｏ）処理順序がビデオストリーム＃４、＃２、＃１、＃３の順になされる。これにより、ビデオストリーム＃１（２２０）と＃３（２３０）は周期Ｔｉ－１でデュアルポートＲＡＭ３２に入力され、周期Ｔｉでハードディスクドライブ３４の割り当てられた記録領域に記録される。一方、ビデオストリーム＃２（２１０）と＃４（２００）は周期Ｔｉでハードディスク記録領域から読み出して周期Ｔｉ＋１でデュアルポートＲＡＭ３２からビデオ復元部５０に出力（再生）される。もし、遅延なく再生が連続的に行われると仮定すれば、各周期毎に次の周期に再生されるビデオストリームを記録領域から読み出さなければならないし、反対に録画の場合はビデオストリームが記録される周期以前に予めビデオストリームを生成させるべきである。

【００３２】上述したように、円形バッファ領域１３０をハードディスク記録領域のセンタ部分に配置すれば、そうでない場合と比べて平均的に発生するヘッドの移動時間、すなわち平均探索時間を最小化することができる。

【００３３】図８は本発明の実施例によるハードディスク記録領域を単純化したもので、二つのビデオストリームブロックが記録貯蔵されるトラックがそれぞれｉとｊだけｎ（円形バッファ領域が位置するトラックまたは領域）から離隔された状態を示す。例示したように、円形バッファ領域がｎに位置している場合、円形バッファ領域で処理されるビデオストリームと任意の二つのビデオストリームのブロックをＣ－ＬＯＯＫアルゴリズムを使用して処理すれば、ｉだけ探索を遂行しなければならない。しかし、円形バッファ領域がトラック０に位置していると、ｉ＋ｎだけの探索が遂行されるべきなので、ｎだけの距離をさらに探索しなければならない。つまり、本発明は時間遅延視聴と同時に録画及び再生を遂行することにおいて、ヘッドの移動時間を減少させることが可能になる。

【００３４】

【発明の効果】本発明は、時間遅延視聴と同時に放送信号録画及び再生が可能な放送受信システムで記録媒体の記録領域を円形バッファ領域と非連続ファイル配置領域に分割して使用することにより、制限された空間内で記録領域の再活用が自動的に行われることはもちろん、ビデオストリームを論理的なビデオファイル単位で構成できる効果がある。また、選択的に記録された任意のビデオファイルの削除が可能であり、なによりもヘッドの探索時間を短縮させてデータアクセス速度を高速化することができる効果がある。

【図面の簡単な説明】

【図１】時間遅延視聴のための放送受信システムでハードディスクを円形バッファ形態で管理する方法を説明するための図である。

【図２】多数のビデオストリームがハードディスク面で非連続的に配置されるように管理する他の方法を説明するための図である。

【図３】多数のビデオストリームを実時間で録画及び再生するためのハードディスクドライブのＩ／Ｏトランザクションスケジューリング例示図である。

【図４】本発明の一実施例による時間遅延視聴と同時に放送信号録画及び再生が可能な放送受信システムのブロック構成図である。

【図５】本発明の一実施例によるハードディスク記録領域の分割配置例示図である。

【図６】本発明の一実施例により分割されるハードディスク記録領域に記録貯蔵されるビデオストリームの例示図である。

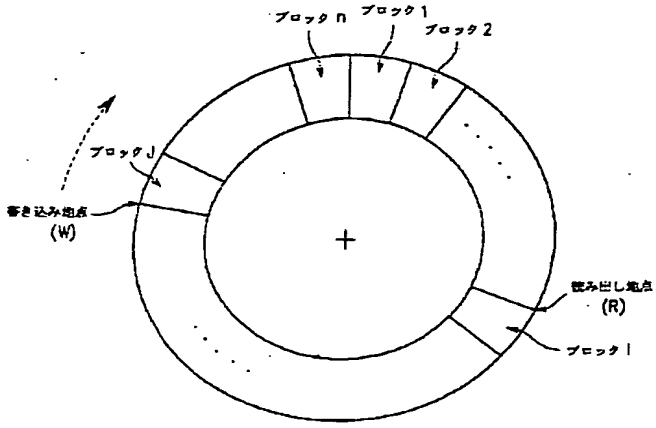
【図７】Ｃ－ＬＯＯＫアルゴリズムを使用して図６のように割り当てられた各ストリームを処理する過程を説明するための図である。

【図８】本発明の実施例によるハードディスク記録領域を単純化した図である。

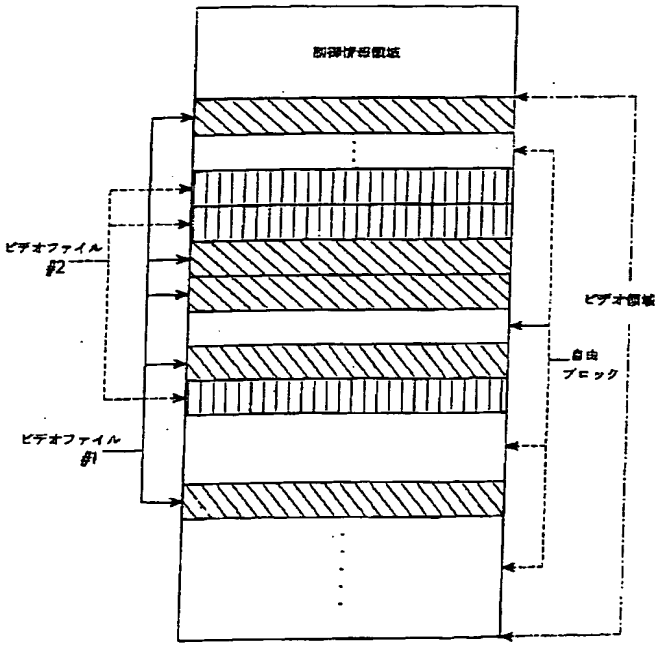
【符号の説明】

１０　放送信号受信部
１２、１４、１６　ＲＦチューナ
１８、２０、２２　圧縮器
３０　ランダムアクセス貯蔵装置
３２　デュアルポートＲＡＭ
３４　ＨＤＤ（ハードディスクドライブ）
４０　制御部
５０　ビデオ復元部
６０　遠隔制御部
７０　コンピュータ接続部
８０　時間チェック部
９０　テレビジョン受像部
１１０Ａ、１１０Ｂ　ビデオファイル領域
１２０　制御情報領域
１３０　円形バッファ領域
１４０　一般ファイル領域
２００、２１０、２２０、２３０　ビデオストリーム

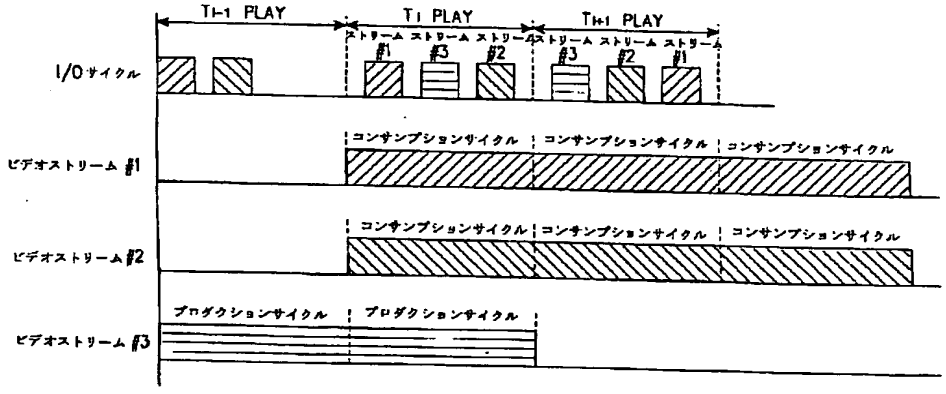
【図１】


ブロック n
ブロック 1
ブロック 2
ブロック J
書き込み地点
(W)
読み出し地点
(R)
ブロック I

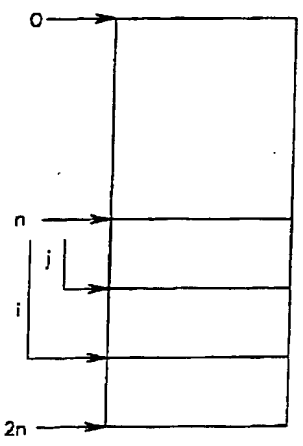
【図２】


制御情報領域
ビデオファイル
#2
ビデオファイル
#1
ビデオ領域
自由
ブロック

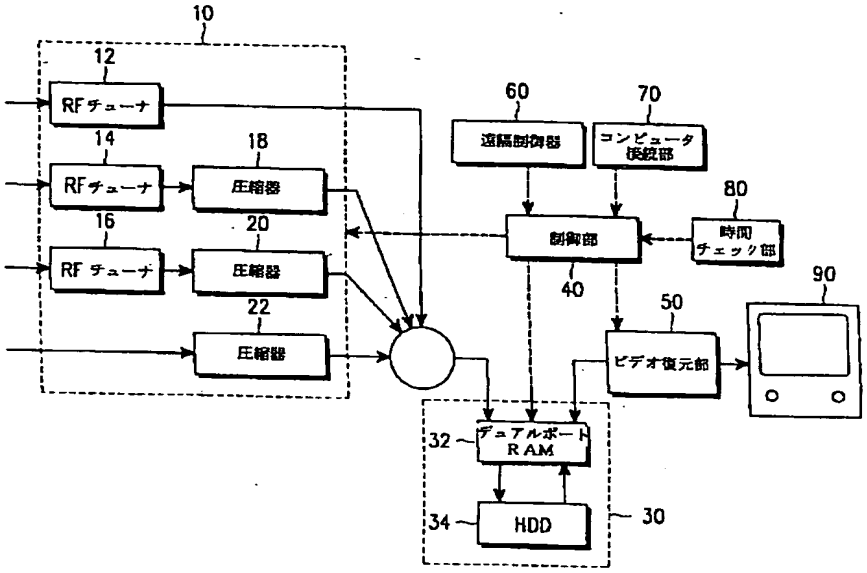
【図３】


Ti-1 PLAY
Ti PLAY
Ti+1 PLAY
ストリーム #1
ストリーム #3
ストリーム #2
I/Oサイクル
ビデオストリーム #1
ビデオストリーム #2
ビデオストリーム #3
コンサンプションサイクル
プロダクションサイクル

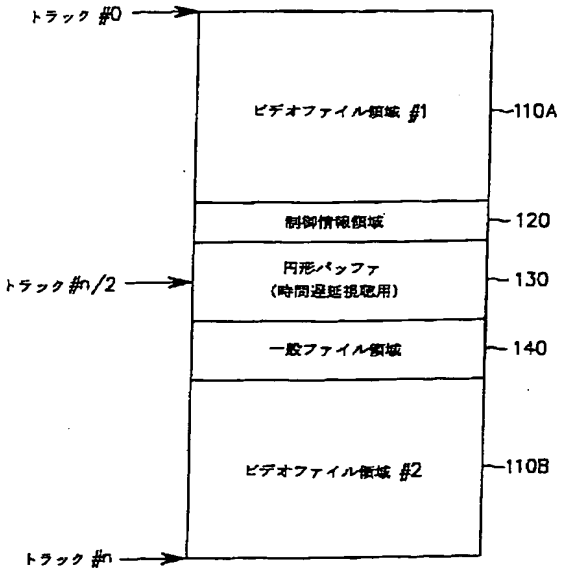
【図８】


0
n
j
i
2n

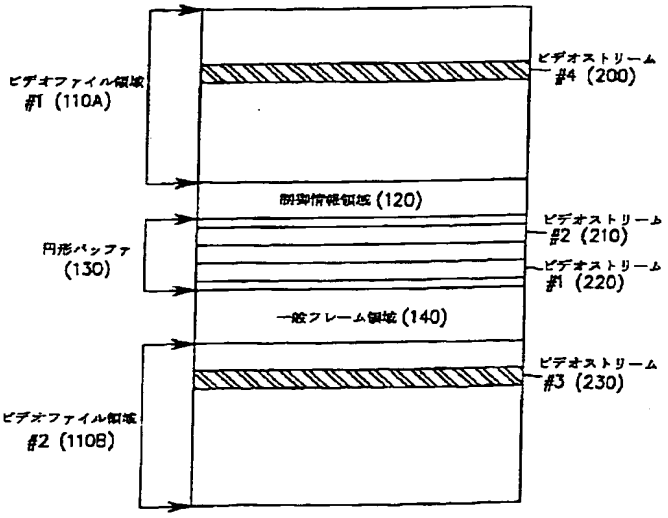
【図４】


10
12
RFチューナ
14
RFチューナ
16
RF チューナ
18
圧縮器
20
圧縮器
22
圧縮器
60
遠隔制御器
70
コンピュータ接続部
80
時間チェック部
制御部
40
50
ビデオ復元部
90
32
デュアルポートRAM
34
HDD
30

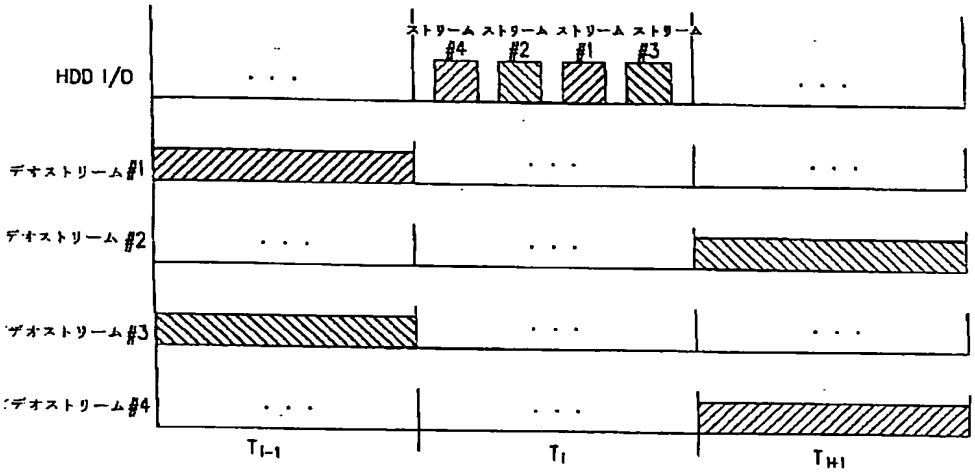
【図５】


トラック #0
ビデオファイル領域 #1
110A
制御情報領域
120
トラック #n/2
円形バッファ
(時間遅延視聴用)
130
一般ファイル領域
140
ビデオファイル領域 #2
110B
トラック #n

【図６】


ビデオファイル領域
#1 (110A)
ビデオストリーム
#4 (200)
制御情報領域 (120)
円形バッファ
(130)
ビデオストリーム
#2 (210)
ビデオストリーム
#1 (220)
一般フレーム領域 (140)
ビデオストリーム
#3 (230)
ビデオファイル領域
#2 (110B)

【図７】


ストリーム #4
ストリーム #2
ストリーム #1
ストリーム #3
HDD I/O
デオストリーム #1
デオストリーム #2
デオストリーム #3
デオストリーム #4
T I-1
T I
T I+1

PATENT ABSTRACTS OF JAPAN

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(54) OPTICAL DISK DRIVE DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an optical disk drive device which can check quality of an optical disk by realizing the operation of recording data in an optical disk and the reproduction of the recorded data in real time using one head.
SOLUTION: Digital data of the prescribed quantity stored in a first storage means 13 is read out with speed (n) (integer of 2 or more) times as much as that of writing or

more, an optical disk 17 is rotated with speed (n) times as much as that of normal writing or more, and recording is performed. And the optical disk 17 is rotated with speed (n) times as much as that of normal reading or more, digital data of the prescribed quantity recorded in the optical disk 17 is read out, and its error rate or the number of impossibility for correction is discriminated.

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] 1st storage means by which specified quantity writing ** rare ****** of the digital data containing an image component is carried out, A record means to write in the digital data of the specified quantity accumulated in this 1st storage means, to read at the rate beyond n (two or more integers) twice at the time, to make rotate an optical disk at the rate of n times or more at the time of the usual writing, and to record, A reading means to read the digital data of the specified quantity which was

made to rotate the optical disk on which the digital data of the specified quantity was recorded by this record means at the rate of n times or more at the time of the usual reading, and was recorded, Optical disk drive equipment characterized by coming to provide a judgment means to judge the error rate or the number of correction impossible of digital data of the specified quantity read in the optical disk at the rate of n times or more usual with this reading means.

[Claim 2] Optical disk drive equipment according to claim 1 with which the digital data of the specified quantity read with said reading means is characterized by coming to provide the 2nd storage means written in and accumulated at the rate of n usual times or more, and a playback means to read the digital data of the specified quantity accumulated in this 2nd storage means at the rate of usual, and to reproduce.

[Claim 3] Said judgment means is optical disk drive equipment according to claim 1 characterized by generating warning when it is judged that the error rate or the number of correction impossible of digital data of the specified quantity read in said optical disk at the rate of n usual times or more judged whether it would have exceeded substantially the reference value set up beforehand, and has exceeded.

[Claim 4] Optical disk drive equipment according to claim 3 characterized by coming to provide the control means which makes the digital data of the specified quantity accumulated in said 1st storage means by said judgment means using said record means where said error rate or the number of correction impossible is judged to have exceeded the reference value substantially re-record on other fields of said optical disk.

[Claim 5] An operation means to ask for the error rate or the number of correction impossible in a block unit of digital data of the specified quantity by which said judgment means was read in said optical disk at the rate of n usual times or more, An equalization means to calculate the average over a fixed period of the error rate or the number of correction impossible called for with this operation means, Optical disk drive equipment according to claim 1 characterized by coming to provide a comparison means to compare the average of the error rate or the number of correction impossible called for with this equalization means with the reference value set up beforehand.

[Claim 6] Said judgment means is optical disk drive equipment according to claim 1 characterized by coming to provide a comparison means to compare an operation means to ask for the error rate or the number of correction impossible in a block unit of digital data of the specified quantity read in said optical disk at the rate of n usual times or more, and the error rate or the number of correction impossible called for with this operation means with the reference value set up beforehand.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical disk drive equipment which carries out record playback of the digitized image data, the voice data, etc. at an optical disk, especially, is reproduced on real time at the time of data logging to that optical disk, and relates to the thing which enabled it to check the quality of an optical disk.

[0002]

[Description of the Prior Art] As everyone knows, in recent years, not only voice data but image data can be compressed into the same optical disk with a diameter of 12cm as CD for voice (Compact Disk), and it can record now, for example on it. As this kind of an optical disk, CD-ROM (Read Only Memory) etc. has spread over a broad field, for example until it results [from the object for information] in karaoke.

[0003] Moreover, recently, DVD-ROM which recorded CD, the main image data of the amount which is equivalent to the movie for about 2 hours at the optical disk of the diameter of said, eight kinds of voice data, and the subimage data showing 32 kinds of titles etc. is developed. And in current, the MPEG(Moving Picture Image Coding Experts Group) 2 compression method international-standard-ized to image data is used, and DVD specification which adopted AC3 compression method to voice data is also proposed.

[0004] This DVD specification supports AC3 method and an MPEG method as a speech compression method, and has further the composition of having added the subimage data which come to carry out run length compression of the bit map data as an object for titles, and a rapid traverse and CDC already for special playback of return etc. (navigation pack) while it uses MPEG 2 for an image compression method according to an MPEG 2 system layer.

[0005] Moreover, by this DVD specification, Micro UDF (Universal Disk Format) is supported with ISO (International Organization for Standardization)9660 so that a personal computer can also read data, for example.

[0006] By the way, although this DVD specification is the specification only set to playbacks and it is not taken into consideration about the image record regeneration system for home use, the optical disk which can perform the writing and rewriting of data has also been developed, for example like DVD-RAM (Random Access Memory) now. For this reason, it is greatly expected in the near future that the image record regeneration system for home use which uses a rewritable optical disk as a record medium appears in a commercial scene.

[0007] On the other hand, as an image record regeneration system for home use in the present condition, the analog VTR (Video Tape Recorder) which used the

magnetic tape as a record medium occupies the mainstream. By the way, since he is trying to make one head serve a double purpose by record and playback in order to simplify a configuration and to lower cost, it is [this kind of analog VTR] impossible to reproduce data [finishing / record] from a magnetic tape to coincidence during record actuation.

[0008] That is, in the conventional analog VTR, if a magnetic tape is rewound and it does not reproduce after record actuation is completed, data can distinguish whether it was correctly recorded on the magnetic tape. for this reason — for example, when degradation had arisen in some magnetic tapes, or when the whole magnetic tape has deteriorated even on the level which is not the optimal as a record medium, a user will notice what a magnetic tape is played and begun and is not recorded correctly, after all record actuation is completed.

[0009]

[Problem(s) to be Solved by the Invention] As mentioned above, with the conventional VTR, if a magnetic tape is not played after all record actuation is completed since the data recorded on the magnetic tape are unreproducible on real time, it cannot distinguish whether it is recorded correctly but has the problem that handling is inconvenient to a user.

[0010] Then, this invention was made in consideration of the above-mentioned situation, realizes record actuation of the data to an optical disk, and playback on the real time of that record data using one head, and aims at offering the very good optical disk drive equipment which can perform the quality check of an optical disk.

[0011]

[Means for Solving the Problem] 1st storage means by which specified quantity writing ** rare ****** of the digital data with which the optical disk drive equipment concerning this invention contains an image component is carried out, A record means to write in the digital data of the specified quantity accumulated in this 1st storage means, to read at the rate beyond n (two or more integers) twice at the time, to make rotate an optical disk at the rate of n times or more at the time of the usual writing, and to record, A reading means to read the digital data of the specified quantity which was made to rotate the optical disk on which the digital data of the specified quantity was recorded by this record means at the rate of n times or more at the time of the usual reading, and was recorded, It has a judgment means to judge the error rate or the number of correction impossible of digital data of the specified quantity read in the optical disk at the rate of n times or more usual with this reading means.

[0012] The digital data which should be recorded is accumulated in the 1st storage means, and data are read in this 1st storage means at the usual rate beyond n (two or more integers) twice, and it records on an optical disk, and he reads that recorded digital data in an optical disk at the rate of n usual times or more, and is trying to judge an error rate or the number of correction impossible according to the above

configurations.

[0013] Namely, since it makes it possible to realize record actuation of the digital data to an optical disk, and playback on the real time of the record data using one optical head, and to perform the quality check of an optical disk Like before, after all record actuation is completed, a magnetic tape is played and begun, un-arranging [of noticing what is not recorded correctly] is lost, and the handling for a user can be made convenient.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained to a detail with reference to a drawing. In drawing 1 , a sign 11 is an input terminal and the digitized image data are supplied. The image data supplied to this input terminal 11 are supplied to the buffer circuit 13 for record which constitutes the drive block 12 of optical disk drive equipment.

[0015] In this buffer circuit 13 for record, while carrying out constant-rate are recording of the inputted image data based on control of the buffer controller 14, this stored image data is read at the twice [at the time of are recording / more than] as many rate as this. And the image data read from this buffer circuit 13 for record are recorded on an optical disk 17 through the optical head 16, after a modulation circuit 15 is supplied and addition and predetermined modulation processing of an ECC (Error Correction Code) sign are performed.

[0016] At this time, the optical disk 17 is controlled for record linear velocity to double [more than] so that a rotation drive is usually carried out at a twice [at the time of record / more than] as many rate as this that is,. Moreover, as for the optical head 16, the write-in actuation and read-out actuation of image data to an optical disk 17 are controlled by the optical head driver 18.

[0017] As mentioned above, if it usually finishes recording the digital data of the constant rate accumulated in the buffer circuit 13 for record on an optical disk 16 at a twice [at the time of record / more than] as many rate as this, the optical head 16 will be returned to a recording start location. And the rotation drive of the optical disk 17 is carried out at the same twice [usual / more than] as many rate as the time of record as this, and the record data of an optical disk 17 are read by the optical head 16.

[0018] The data usually read with this optical head 16 at the twice [at the time of playback / more than] as many rate as this are supplied to the buffer circuit 20 for playback, after a demodulator circuit 19 is supplied and recovery processing and ECC data processing are performed. In this buffer circuit 20 for playback, while storing the inputted data at a twice [usual / more than] as many rate as this based on control of the above-mentioned buffer controller 14, it has read at the rate (the usual rate) which set this stored data by the rate of data processing by the latter decoding circuit 21.

[0019] And the data outputted from this buffer circuit 20 for playback are changed into the analog video signal of for example, an NTSC (National Television System Committee) method by the decoding circuit 21 and the D/A (Digital/Analogue) conversion circuit 22, and are taken out from an output terminal 23.

[0020] In addition, the above-mentioned drive block 12 is controlled by the system controller 24 in generalization. Moreover, this system controller 24 receives a demand of a user through a user interface 25.

[0021] Here, the error rate judging circuit for judging the error rate of the data read in the optical disk 17, and judging degradation of an optical disk 17 is established in the above-mentioned demodulator circuit 19. Drawing 2 shows the detail of this error rate judging circuit. That is, the data read with the optical head 16 are supplied to ECC arithmetic circuit 19b through input terminal 19a, and ECC data processing for error detection is performed.

[0022] And the result of an operation of this ECC arithmetic circuit 19b is supplied to block error rate arithmetic circuit 19c, and the error rate in a predetermined block unit is called for. The error rate in the block unit searched for by this block error rate arithmetic circuit 19c is supplied to 19d of error rate equalization circuits, and in order are wide range and to check the generating situation of an error, equalization of the error rate over a fixed period is performed.

[0023] Then, the average value of the error rate obtained in 19d of this error rate equalization circuit is compared with the reference value of the error rate for the degradation judging of an optical disk 17 currently held beforehand at reference-value holding circuit 19e at 19f of comparator circuits, and that comparison result is outputted to the above-mentioned system controller 24 through 19g of output terminals.

[0024] In this system controller 24, when the comparison result that the average of the error rate obtained in 19d of error rate equalization circuits exceeds substantially the reference value of the error rate currently held at reference-value holding circuit 19e is obtained, it judges that the optical disk 17 crossed broadly and has deteriorated, and warns a user of that through a user interface 25.

[0025] In addition, the 19f of the above-mentioned comparator circuits compares the reference value of the error rate in the block unit searched for by the above-mentioned block error rate arithmetic circuit 19c, and the error rate for a degradation judging in the block unit currently held beforehand at the above-mentioned reference-value holding circuit 19e, and they are outputting the comparison result to the above-mentioned system controller 24.

[0026] For this reason, in a system controller 24, when the comparison result that the error rate obtained by block error rate arithmetic circuit 19c exceeds substantially the reference value of the error rate currently held at reference-value holding circuit 19e is obtained, it is judged that the field of the optical disk 17 corresponding to that block

has deteriorated.

[0027] In this case, a system controller 24 reads that block data from the record buffer circuit 13, it is again written in other locations of an optical disk 17 at high speed, and it reads it from an optical disk 17 at high speed once again, and judges an error rate. And when it is judged that an error rate exceeds a reference value again, it warns a user of that.

[0028] Drawing 3 and drawing 4 are drawings in which the record playback actuation to the above-mentioned optical disk 17 was summarized for convenience. First, suppose that the record data which have a data length as shown in drawing 3 (a) were stored in the buffer circuit 13 for record. Then, as shown in drawing 3 (b), this record data is read from the buffer circuit 13 for record at a twice [usual / more than] as many rate as this, and is recorded on an optical disk 17 at a twice [usual / more than] as many rate as this.

[0029] After record actuation at this high speed is completed, the optical head 16 is returned to a recording start location, and as shown in drawing 3 (c), data are reproduced from an optical disk 17 at a twice [usual / more than] as many rate as this. And when the judgment of an error rate is performed to this data by which high-speed playback was carried out and it is judged that it is as low without an error as an error rate does not produce a problem in ****, that data becomes [being recorded on an optical disk 17 with as, and].

[0030] Moreover, at the time of playback of an optical disk 17, the data reproduced from the optical disk 17 at the twice [usual / more than] as many rate as this are stored in the buffer circuit 20 for playback at a twice [usual / more than] as many rate as this, and as shown in drawing 3 (d), they are read at the rate of usual.

[0031] Suppose that the record data which, on the other hand, have a data length as shown in drawing 4 (a) were stored in the buffer circuit 13 for record. Then, as shown in drawing 4 (b), this record data is read from the buffer circuit 13 for record at the rate of 4 usual times or more, and is recorded on an optical disk 17 at the rate of 4 usual times or more.

[0032] After record actuation at this high speed is completed, the optical head 16 is returned to a recording start location, and as shown in drawing 4 (c), data are reproduced from an optical disk 17 at the rate of 4 usual times or more. And the judgment of a block error rate is performed to this data by which high-speed playback was carried out, and when an error rate is judged to exceed a reference value, as shown in drawing 4 (b), that data is again read in the buffer circuit 13 for record at the rate of 4 usual times or more, and it records on other fields of an optical disk 17 again at the rate of 4 usual times or more.

[0033] And after record actuation for the second time at this high speed is completed, the optical head 16 is returned to a recording start location, and as shown in drawing 4 (c), data are reproduced from an optical disk 17 at the rate of 4 usual times or more.

Then, when the judgment of a block error rate is performed to this data by which high-speed playback was carried out and an error rate is judged to be lower than a reference value, that data becomes [being recorded on an optical disk 17 with as, and].

[0034] Moreover, at the time of playback of an optical disk 17, the data reproduced from the optical disk 17 at the rate of 4 usual times or more are stored in the buffer circuit 20 for playback at the rate of 4 usual times or more, and as shown in drawing 4 (d), they are read at the rate of usual. However, the judgment of a block error rate is performed to the 2nd data by which high-speed playback was carried out, and when an error rate is judged to exceed a reference value, it is warned of that to a user.

[0035] According to the above-mentioned gestalt of operation, the data which should be recorded are stored in the buffer circuit 13 for record. Read data in this buffer circuit 13 for record at the usual rate beyond n (two or more integers) twice, and it records on an optical disk 17. The data is read in an optical disk 17 at the rate of n usual times or more, and an error rate is judged, and when an error rate is high, he is trying to re-record the same data on other fields of an optical disk 17.

[0036] Namely, since it makes it possible to realize record actuation of the data to an optical disk 17, and playback on the real time of the record data using one optical head 16, and to perform the quality check of an optical disk 17 Like before, after all record actuation is completed, a magnetic tape is played and begun, un-arranging [of noticing what is not recorded correctly] is lost, and the handling for a user can be made convenient. Moreover, you may make it judge the quality of an optical disk 17 for example, not only from an error rate but from the number of error correction impossible. In addition, this invention is not limited to the above-mentioned gestalt of operation, in the range which does not deviate from that summary this outside, can deform variously and can be carried out.

[0037]

[Effect of the Invention] As explained in full detail above, according to this invention, record actuation of the data to an optical disk and playback on the real time of that record data can be realized using one head, and the very good optical disk drive equipment which can perform the quality check of an optical disk can be offered.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block block diagram showing the gestalt of implementation of this invention.

[Drawing 2] The block block diagram showing the detail of the error rate judging circuit

in the gestalt of this operation.

[Drawing 3] Drawing shown in order to explain record playback actuation of the data in the gestalt of this operation.

[Drawing 4] Drawing shown in order to explain record playback actuation of the data in the gestalt of this operation.

[Description of Notations]

11 — Input terminal,

12 — Drive block,

13 — Buffer circuit for record,

14 — Buffer controller,

15 — Modulation circuit,

16 — Optical head,

17 — Optical disk

18 — Optical head driver,

19 — Demodulator circuit,

20 — Buffer circuit for playback,

21 — Decoding circuit,

22 — D/A conversion circuit,

23 — Output terminal,

24 — System controller,

25 — User interface.